# Chapter 7.23
# A Socio-Technical Analysis of Factors Affecting the Integration of ICT in Primary and Secondary Education

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## ABSTRACT

We live in a world that is constantly impacted by information and communication technology (ICT). ICT is considered an important catalyst and tool for inducing educational reforms and progressively extending and modifying the concept of literacy. With the extensive use of ICT in schools and everyday life, the term computer literate has already been established. Schools are open systems that interact with their environment, and the effective use and integration of technology is directly associated with the role of various socio-technical factors that may impact the integration of ICT in schools. In this chapter, we report on an exploratory study undertaken in Cyprus schools to examine the status of using ICT from the perspective of socio-technical systems. Specifically, teachers' knowledge of ICT, frequency of using ICT for personal purposes, frequency of using ICT for instructional purposes in different subject matters, attitudes toward ICT, self-confidence in using ICT in teaching and learning, and school climate were examined. The findings provide useful guidance to policymakers for planning, implementing, managing, and evaluating the integration of ICT in schools. Implications for the concept of computer literacy are discussed.

## INTRODUCTION

Due to rapid technological advancements, we live in a world that is constantly impacted by information and communication technologies (UNESCO, 1999). Some key-markers that characterize differences between 19th-century societies (i.e., industrial-age societies) and 20th-century[1] societies (i.e., information age societies) are: (a) standardization vs. customization, (b) bureaucratic organizations vs. team-based organizations, (c) adversarial relationships vs. cooperative relationships, (d) parts oriented vs. process oriented, (e) compliance vs. initiative, and (f) conformity vs. diversity (Reigeluth & Garfinkle, 1994). By virtue of these differences, we are obliged to evaluate once more the worth of our existing educational systems. Are our current educational systems, with their emphasis on content coverage and teacher-centered classroom practices, conducive to preparing students to survive in a changing world that is steadily shaped by developments in information technologies? How do we prepare our future citizens to become computer or technology literate? Do new computer technologies herald the beginning of an era of broader literacy, and if we are educating children to be active citizens in an information society, what forms of literacy are required? What does it mean to be literate, an active reader, a writer, and a communicator of meaning in the information society?

Countries in North America, South America, Europe, Asia, and Africa have all identified a significant role for information and communication technology (ICT[2]) in improving education and reforming curricula for the purpose of preparing future citizens to be productive and actively involved in an information society (Kozma & Anderson, 2002; Pelgrum, 2001). ICT is considered by many not only to be the "backbone of the Information Society, but also to be an important catalyst and tool for inducing educational reforms that change our students into productive knowledge workers" (Pelgrum, 2001, p. 165). For these reasons, schools have made major investments and continue to invest heavily in increasing the number of computers in schools and the networking of classrooms.

ICT is thus steadily becoming part of classroom life, and it progressively changes the concept of literacy (Brindley, 2000; Watt, 1980). The traditional concept of literacy as the ability to read and write (Crystal, 1987x) is changing, and ICT opens up a further definition of literacy—one that goes beyond the acquisition of basic skills. Brindley (2000) argues that "schooled literacy, which traditionally sees the acquisition of the ability to construct and interpret text as largely an individual activity, bounded by the concept of text as linear and fixed, is no longer adequate" (p. 13). With the enduring introduction of computers in schools and the extensive use of ICT in our everyday life, the term computer literate has been established and flourished.

For many, being computer literate simply means acquiring technical expertise to be able to competently use computer software and hardware. In this chapter, we consider a much more complex and exciting concept of computer literacy—one that is directly associated with the affordances of ICT and the concept of visual literacy. "Visual literacy refers to the use of visuals for the purposes of communication, thinking, learning, constructing meaning, creative expression, [and] aesthetic enjoyment" (Baca, 1990, p. 65). Thus, the extensive use of multimedia in schools and everyday life opens up the way to an extended concept of literacy. For example, ICT reinvents the text and leads us to a new form of literacy, which encompasses a range of media by which students learn and communicate, such as graphics, video, and sound (Papert, 1993). Similarly, McFarlane (2000) argues that multimedia allow students to record and present their own meaning using multiple media. Thus, the technology of multimedia does not restrict reading and writing to the mere coding and decoding of text. Using a computer, children can represent their creativity